

## CLAIMS

1) A method of generating a hybrid grid suited to a heterogeneous formation crossed by at least one pipe or well of known geometry, in order to form a model representative of fluid flows in this medium in accordance with a defined numerical pattern, the structure of the formation being known a priori from available data acquired through in-situ measurements, analyses and/or interpretations of images of the formation, including associating a first structured grid for gridding the formation by respecting the discontinuities thereof with second structured, radial type grids for gridding of the zones around the wells, these second grids allowing to respect constraints linked with flows in wells, characterized in that a non-structured transition grid formed by applying the process referred to as generalized map process, is inserted between the first structured grid associated with the formation and each second structured grid associated with a well.

2) A method as claimed in claim 1, characterized in that the second structured grid is imported in a cavity, the size of this cavity being sufficient to allow formation of a non-structured transition grid between the first structured grid associated with the formation and the second structured grid associated with each well, the non-structured transition grid being formed by respecting constraints linked with said numerical pattern, the first structured grid being matrically structured, globally or by faulted blocks.

3) A method for simulating, in accordance with a defined numerical pattern, the evolution of a process such as fluid flows in a heterogeneous medium crossed by at least one pipe or well of known geometry, the structure of the formation being known a priori

from available data acquired through in-situ measurements, analyses and/or interpretations of formation images, including forming a hybrid grid by associating a first structured grid for gridding the formation by respecting the discontinuities thereof a second, radial type structured grid for gridding a zone around each well, these second  
5 grids allowing to respect constraints linked with flows in the wells, characterized in that it includes inserting a non-structured transition grid formed by applying a process referred to as generalized map process, between the first structured grid associated with the formation and each second structured grid associated with the wells, and solving the numerical pattern in the hybrid grid formed for the medium in order to simulate the  
10 process.